PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P017878WO	FOR FURTHER ACTION	See Form PCT/PEA/416
International application No. PCT/GB2004/003064	International filing date (day/month/year) 14.07.2004	Priority date (day/month/year) 12.08.2003

International Patent Classification (IPC) or national classification and IPC

H04L12/56

Applicant

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1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

3. This report is also accompanied by ANNEXES, comprising:

   a. ☒ *sent to the applicant and to the International Bureau)* a total of 7 sheets, as follows:

      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).

      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

   ☒ Box No. I   Basis of the opinion

   ☐ Box No. II   Priority

   ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

   ☐ Box No. IV Lack of unity of invention

   ☒ Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

   ☐ Box No. VI Certain documents cited

   ☐ Box No. VII Certain defects in the international application

   ☐ Box No. VIII Certain observations on the international application

Date of submission of the demand 22.03.2005	Date of completion of this report 12.07.2005
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Perrier, S Telephone No. +31 70 340-4245

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2004/003064

Box No. I   Basis of the report

1. With regard to the **language,** this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:

   ☐ international search (under Rules 12.3 and 23.1(b))
   ☐ publication of the international application (under Rule 12.4)
   ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

   Description, Pages

   1-13, 15-22   as originally filed

   14   received on 24.03.2005 with letter of 22.03.2005

   Claims, Numbers

   1-25   received on 24.03.2005 with letter of 22.03.2005

   Drawings, Sheets

   1/10-10/10   as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   ☐ the description, pages
   ☐ the claims, Nos.
   ☐ the drawings, sheets/figs
   ☐ the sequence listing *(specify)*:
   ☐ any table(s) related to sequence listing *(specify)*:

   * *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V   Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	10-19,22-25
	No:	Claims	1-9,20,21
Inventive step (IS)	Yes:	Claims	11-19,23-25
	No:	Claims	1-10,20-22
Industrial applicability (IA)	Yes:	Claims	1-25
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

1. Reference is made to the following documents:

    D1: SHEN QI: "on providing flow transparent mobility support for ipv6-based
    wireless real-time" INTERNET ARTICLE, [Online] 2001, page 0,I-IV,8-19,41-58,
    XP002303163 NATIONAL UNIVERSITY OF SINGAPORE Retrieved from the
    Internet: URL:http://www.cs.columbia.edu/~charles/pu blication/ft-concept.pdf>
    [retrieved on 2004-10-26]

    D2: 3GPP: "TR23.923 V3.0.0: Combined GSM and Mobility Handling in UMTS IP
    CN" 3G TR 23.923 V3.0.0, XX, XX, May 2000 (2000-05), pages 1-75,
    XP002282368

2. The present application does not meet the criteria of Article 33(1) PCT, because the
    subject-matter of claims 1, 20 and 21 is not new in the sense of Article 33(2) PCT.

2.1 INDEPENDENT CLAIM 1
    The document D1 discloses (the references in parentheses applying to this
    document):
    An internet packet comprising a header field, the header field including a field
    identifying a source address of the internet packet, a field identifying the destination
    address of the Internet packet (figure 4.3(c)) and a next header field identifying
    whether an extension header follows the header and a type of the extension header
    (figure 4.3(c), figure 4.4 and page 52, lines 13 to 16), wherein the header field
    identifies that the extension header includes a hop-by-hop extension header (page
    52, lines 19 to 21 and figure 4.3(c)), the hop-by-hop extension header including a
    router alert option header indicating that the hop-by-hop extension header is optional
    for a router to read (figure 4.3(c), figure 4.4 and page 52, lines 13 to 16), and a value
    field indicating that the remainder of the hop-by-hop header is provided for a gateway
    support node of a packet radio network (figure 4.4 and page 52, lines 17 to 19, page
    52, line 22 to 54, line 1 and figure 2.2: router in the foreign network=Gateway Support
    Node), wherein the remainder of the hop-by- hop extension header includes a field

providing a home address of a mobile node (figure 4.3(c)).

Therefore, the present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

Furthermore, even if it could be argued that the internet packet defined in claim 1 is new, based on minor differences in the interpretation of the features as claimed in claim 1 and those disclosed in D1, the subject -matter of claim 1 would certainly not involve an inventive step, Article 33(3) PCT, as document D1 discloses the same internet packet and the same type of solution as the one described in claim 1.

2.2 INDEPENDENT CLAIMS 20 AND 21

The same reasoning as in paragraph 2.1 applies, mutatis mutandis, to the subject-matter of the corresponding independent claims 20 and 21, which therefore are also considered not new in the sense of Article 33(2) PCT.

3. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 22 does not involve an inventive step in the sense of Article 33(3) PCT.

3.1 INDEPENDENT CLAIMS 22

The document D1 discloses (the references in parentheses applying to this document) the use of an IPv6 Router Alert option header for communicating a source home address of a mobile node to a Gateway ... Support Node (page 52, line 19 to page 54, line 1 and page 14, figure 2.2: router in the foreign network=Gateway Support Node), the router alert option header including a field indicating that the router alert option header containing the source home address is intended for the Gateway ... Support Node (page 52, lines 13 to 16 and page 52, line 19 to page 54, line 1).
The subject-matter of claim 11 differs from this known D1 in that the Gateway Support Node is part of a GPRS network.

However, the Gateway Support Node has already been employed for the same

purpose in a GPRS network, see document D2, page 31, lines 17 to 19. It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to employ the Gateway Support Node according to document D1 with the corresponding effect, in a GPRS network, thereby arriving at the use of an IPV6 Router Alert option header according to claim 22.

Therefore, the subject-matter of claim 22 of the present application, cannot be considered as involving an inventive step (Article 33(3) PCT).

4. DEPENDENT CLAIMS 2-10

Dependent claims 2-10 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (claims 2-9) and inventive step (claim 10), see documents D1 and D2 and the corresponding passages cited in the search report.

5. INDEPENDENT CLAIMS 11

The document D1 is regarded as being the closest prior art to the subject-matter of claim 11, and shows (the references in parentheses applying to this document):

A gateway support node operable to provide an interface between an external packet data communications network and a packet radio network (figure 2.2: router in the foreign network=Gateway Support Node), ... the gateway support node being operable upon receipt of the internet packet according to any of claims 1 to 10 (see paragraph 2.1 of that communication),

to detect that a next header field of the internet packet includes a hop-by-hop extension header (page 52, line 21 to page 54, line 1), and

to detect a router alert option header in the hop-by-hop extension header, and a value field indicating that the remainder of the hop-by-hop extension header is provided for the gateway support node (figure 4.4 and page 52, lines 17 to 19, page 52, line 22 to 54, line 1 and figure 2.2: router in the foreign network=Gateway Support Node), and upon detecting the value field indicating that the remainder of the hop-by-hop extension header field is for the gateway support node,

to recover information from a field provided in the remainder of the hop-by-hop extension header for use in controlling egress and/or ingress of Internet packets to

the packet radio network in accordance with the information (page 52, line 21 to page 54, line 1), wherein

The subject-matter of claim 11 differs from this known D1 in that:
... the packet radio network providing a plurality of packet data bearers for communicating the Internet packets with nodes attached to the packet radio network, each of the packet data bearers being defined with respect to a source home address of nodes communicating the internet packets, ...
 the gateway support node is operable
 to control ingress of internet packets from the external communications network to the packet data bearers of the packet radio network, by
 detecting from the information field provided in the remainder of the hop-by-hop extension header a source home address of a mobile correspondent node communicating the internet packets,
 using the home address to identify the packet data bearer for communicating the Internet packets to a correspondent node attached to the packet radio network, and
 allowing ingress of the Internet packets to the identified packet data bearer.

The subject-matter of claim 11 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to control ingress of internet packets from external communication networks to the packet data bearers.

The solution to this problem proposed in claim 11 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons: None of the available prior art discloses or suggests such a solution. Document D2 raises the same problem as in the application (see D2, page 25, lines 20 to 23) but does not propose a solution in concrete terms.

5.1 INDEPENDENT CLAIM 18, 23, 24 AND 25
The same reasoning as in paragraph 5. applies, mutatis mutandis, to the subject-matter of the corresponding independent claims 18, 23, 24 and 25, which

therefore are also considered to meet the requirements of the PCT with respect to novelty and inventive step.

6. DEPENDENT CLAIMS 12-17 AND 19
    Claims 12-17 and 19 are dependent on claims 11 and 18 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

extension header. The field "Header Extension Length" 620 provides an indication of the length of the extended header if present.

The next fields in the IP packet are specified in accordance with the router-alert option type [4]. The first of these fields provides the "Router Alert Option" field 622.

5   The "Router Alert Option" field provides an indication that the field is for alerting routers and has a value of zero specified as three bits (000). The next field 624 provides a "hop-by-hop option type" which is set to a value of five by a field length of five bits.

The next field 626 provides a value field and is set to a value to indicate that

10   the information in the remainder of the header is provided for the GGSN of a GPRS network. This value may be any value which has not so far been reserved in the specification [4]. For example the value may be "3". Alternatively, it may be possible to utilise a value already reserved such as "2" meaning "Datagram contains an active network message". If the definition of the value "2" permits the use of this value for

15   mobility information for the GGSN, then this value may be re-used. Otherwise the next available value which is "3" will be used. The remaining field 628 provides the information to the GGSN.

One example of the information for the GGSN which may be provided in the field 626 is the mobile node's home address. This provides a 128-bit address field.

20   The router alert field in contrast is only 3 –bits with the "hop-by-hop option type" field being only 5-bits. As a result, since every router along the communications path must only read 3-bits to determine whether the information is relevant to the router concerned, a performance loss is substantially reduced with respect to a performance loss which may have occurred if a remaining 128-bit address field was also required to

25   be read by every router along the communications path.

Summary of the Operation of the GGSN for TFT

In summary, by analysing the hop-by-hop field in combination with the source address field the TFT controller 500 can identify the appropriate bearer 520 to communicate the Internet packets to the correspondent node CN because the list 502

30   includes the home address of the mobile node. The operation of the GGSN when

CLAIMS

1.   An internet packet comprising a header field, the header field including a field identifying a source address of the internet packet, a field identifying the destination address of the internet packet and a next header field identifying whether

5   an extension header follows the header and a type of the extension header, wherein the header field identifies that the extension header includes a hop-by-hop extension header, the hop-by-hop extension header including a router alert option header indicating that the hop-by-hop extension header is optional for a router to read, and a value field indicating that the remainder of the hop-by-hop header is provided for a

10   gateway support node of a packet radio network, wherein the remainder of the hop-by-hop extension header includes a field providing a home address of a mobile node.

2.   An internet packet as claimed in Claim 1, wherein the router alert option header includes a first field indicating that the hop-by-hop extension header is

15   optional, a second field indicating the hop-by-hop option type number, and a third value field, the value in the third value field indicating that a fourth field provides the home address of a mobile node.

3.   An internet packet as claimed in claim 2 or 3, wherein the first field of

20   the router alert option header is provided as a relatively short field with the effect that a time for a router to read the first field is reduced with respect to a requirement to read all data in the hop-by-hop extension header.

4.   An internet packet as claimed in Claim 3, wherein the first field

25   comprises three bits.

5.   An internet packet as claimed in Claim 4, wherein the three bits are all zeros.

24

6.   An internet packet as claimed in Claims 3, 4 or 5, wherein the second field of the router alert option header indicating the hop-by-hop option type comprises five bits set to a value of five.

5   7.   An internet packet as claimed in any preceding Claim, wherein the internet packet is a IPv6 internet packet.

8.   An internet packet as claimed in any of Claim 1 to 7, wherein the home address of the mobile node corresponds to the source address of the mobile node when 10   associated with a home network when an internet protocol session was initiated.

9.   An internet packet as claimed in any of Claims 1 to 7, wherein the home address of the mobile node corresponds to the destination address of the mobile node associated with a home network when an internet protocol session was initiated.

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10.   An internet packet as claimed in any of Claims 1 to 9, wherein the packet radio network is a General Packet Radio Service network, the information for the gateway support node being provided for a Gateway GPRS Support Node of the GPRS network.

20

11.   A gateway support node (GGSN) operable to provide an interface between an external packet data communications network and a packet radio network, the packet radio network providing a plurality of packet data bearers for communicating the internet packets with nodes attached to the packet radio network, 25   each of the packet data bearers being defined with respect to a source home address of nodes communicating the internet packets, the gateway support node (GGSN) being operable upon receipt of the internet packet according to any of claims 1 to 10,

to detect that a next header field of the internet packet includes a hop-by-hop extension header, and

30   to detect a router alert option header in the hop-by-hop extension header, and a value field indicating that the remainder of the hop-by-hop extension header is provided for the gateway support node, and upon detecting the value field indicating

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that the remainder of the hop-by-hop extension header field is for the gateway support

node, ·

to recover information from a field provided in the remainder of the hop-by-

hop extension header for use in controlling egress and/or ingress of internet packets to

5   the packet radio network in accordance with the information, wherein

the gateway support node is operable

to control ingress of internet packets from the external communications

network to the packet data bearers of the packet radio network, by

detecting from the information field provided in the remainder of the hop-by-

10   hop extension header a source home address of a mobile correspondent node

communicating the internet packets,

using the home address to identify the packet data bearer for communicating

the internet packets to a correspondent node attached to the packet radio network, and

allowing ingress of the internet packets to the identified packet data bearer.

15

12.   A gateway support node as claimed in Claim 11, the gateway support

node being operable

to allow ingress of the internet packets if either the address in the source

address field of the internet packet or the address provided in the field in hop-by-hop

20   extension header for the gateway support node corresponds to a packet data bearer.

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13.   A gateway support node as claimed in Claim 11 or 12, the gateway

support node being operable

to perform egress packet filtering in accordance with a destination address of

25   the internet packets received from the plurality of packet data bearers, egress of the

internet packets being allowed for internet packets having a legitimate destination

address, and upon receipt of the internet packet according to any of Claims 1 to 10,

to detect from the information data provided in the hop-by-hop extension

header field for the gateway support node a destination home address of a mobile

30   correspondent node which is to be the destination of the internet packets, and

to allow egress of the internet packets if the gateway support node recognises

the destination home address as a legitimate home address.

14.   A gateway support node as claimed in Claim 13, the gateway support node being operable to allow egress of the internet packets if either the address in the destination address field of the packet or the address provided in the hop-by-hop

5   extension header for the gateway support node is a legitimate destination address.

15.   A gateway support node as claimed in any of Claims 11 to 14, wherein the gateway support node is operable as a Gateway GPRS Support Node (GGSN), according to the General Packet Radio System standard.

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16.   A packet radio network operable to communicate internet packets between an external packet data network and nodes associated with the packet radio network, the packet radio network providing a plurality of packet data bearers for communicating the internet packets to and/or from the nodes attached to the packet

15   radio network, the packet radio network including a gateway support node as claimed in any of Claims 11 to 15.

17.   A packet radio network as claimed in Claim 16, wherein the packet radio network is operable in accordance with the General Packet Radio System

20   (GPRS) standard, the gateway support node being a Gateway GPRS Support Node (GGSN).

18.   A method of operating a gateway support node to interface between an external packet data communications network and a packet radio network, the packet

25   radio network providing a plurality of packet data bearers for communicating the internet packets with nodes attached to the packet radio network, each of the packet data bearers being defined with respect to a source home address of the nodes communicating the internet packets, the method comprising

receiving an internet packet according to any of claims 1 to 10,

30   detecting that a next header field of the internet packet identifies that an extension header includes a hop-by-hop extension header,

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detecting a router alert option header and a value field in the hop-by-hop extension header indicating that the remainder of the hop-by-hop header is provided for the gateway support node, and upon detecting the value field indicating that the remainder of the hop-by-hop extension header field is for the gateway support node

5   recovering from a field provided in the remainder of the hop-by-hop extension header information for use in controlling egress and/or ingress of internet packets to the packet radio network in accordance with the information,

wherein, the controlling the ingress of internet packets from the external communications network to the packet data bearers of the packet radio network in

10   accordance with the information, includes

detecting from the information provided in the remainder of the hop-by-hop extension header field a source home address of a mobile correspondent node communicating the internet packets, using the home address to identify the packet data bearer for communicating the internet packets to a correspondent node attached to the

15   packet radio network, and

allowing ingress of the internet packets to the identified packet data bearer, and otherwise dropping the internet packet.

19.   A method as claimed in Claim 18, the method comprising

20   performing egress packet filtering in accordance with a destination address of internet packets received from the plurality of packet data bearers, egress of internet packets being allowed for internet packets having a legitimate destination address, and upon receipt of internet packets according to any of Claims 1 to 10,

detecting from information provided in the remainder of the hop-by-hop

25   extension header field for the gateway support node a destination home address of a mobile correspondent node which is to be the destination of the internet packets, and

allowing egress of internet packets if the gateway support node recognises the destination home address as a legitimate home address.

30   20.   A signal representing an internet packet according to any of claims 1 to 10.

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21.   A signal bearing medium, the medium bearing the signal according to Claim 20.

22.   Use of an IPv6 Router Alert option header for communicating a source
5   home address of a mobile node to a Gateway GPRS Support Node, the router alert option header including a field indicating that the router alert option header containing the source home address is intended for the Gateway GPRS Support Node.

23.   A computer program providing computer executable instructions,
10   which when loaded on to a data processor configures the data processor to operate as a gateway support node as claimed in any of Claims 11 to 15.

24.   A computer program having computer executable instructions, which when loaded on to a data processor causes the data processor to perform a method
15   according to any of Claims 18 or 19.

25.   A computer program product having a computer readable medium having recorded thereon information signals representative of the computer program claimed in Claim 23 or 24.

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